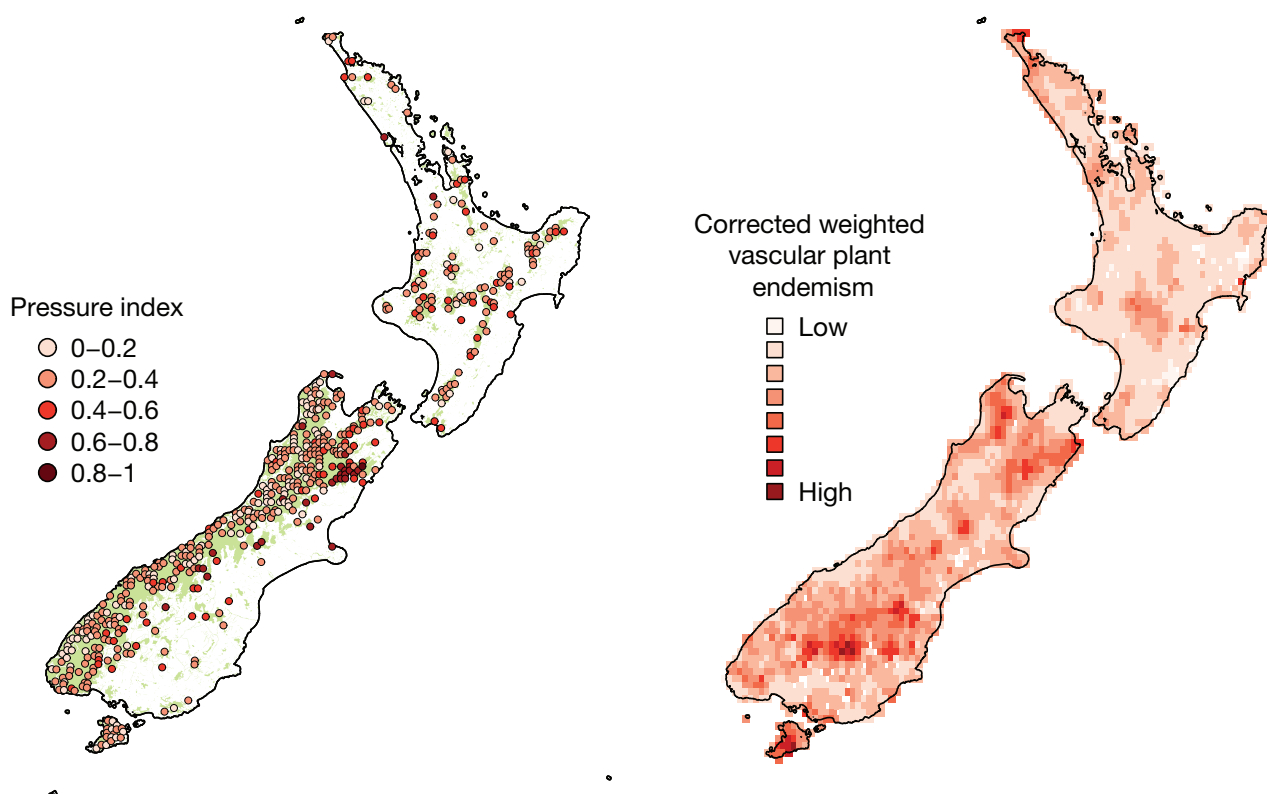# Which areas of public conservation land are under greatest pressure from invasive species?

Summary

An aggregated index of pressures on native ecosystems from invasive mammals, weeds and introduced birds was generally less in native forests (woody ecosystems) (especially in high-rainfall regions) than in shrublands (woody ecosystems) and non-woody ecosystems. Areas under lesser pressure included some important regions of endemism of native plants (such as Kahurangi National Park), but other important centres for plant endemism are under high pressure from invasive species (including invasive conifers), in particular, Marlborough and inland Otago.

Main findings

- Areas under high pressure from invasive species (pest mammals, weeds, and introduced birds) on public conservation land are in dry regions with low-stature vegetation.
- Areas close to roads and non-native forests are under particular pressure.
- Invasions by non-invasive conifers exemplify this pattern, and lodgepole pine can invade alpine ecosystems where no native trees can grow.
- Forested ecosystems, especially in high rainfall areas, are less invaded and are under less pressure.
- Some areas of public conservation land under less pressure from invasive species are important areas for vascular plant endemism (such as Kahurangi National Park.
- Some areas of public conservation land under high pressure from invasive species are important areas for vascular plant endemism (such as inland Marlborough and inland Otago.

Pressure index
- 0–0.2
- 0.2–0.4
- 0.4–0.6
- 0.6–0.8
- 0.8–1

Corrected weighted vascular plant endemism
- Low
- High

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Why is this important?

Focussing conservation management just in the areas that are least-invaded by invasive species (i.e. 'the most natural') may mean that some areas that have high levels of endemism could miss out on protection.

Areas that are heavily invaded by pest mammals and weeds, especially in inland Marlborough and Otago, are major centres of endemism for vascular plants, so these areas might become priority areas for management to reduce pest pressure. There is a need for further evaluation of plant and animal groups with high levels of endemism (e.g. invertebrates, reptiles or non-vascular plants) that might also be under severe pressure from invasive species.

Definitions and methodologies

- This uses information from three Measures, 2.2.1 ("Distribution and abundance of exotic weeds and pests considered a threat – Pest mammals"), 2.2.1 ("Distribution and abundance of exotic weeds and pests considered a threat – Weeds") and 5.1.2 ("Demography of widespread animal species – Birds"), assessed at the same points across all public conservation land (Tier One systematic national sampling).

- The aggregated pressure index is an indicator of the potential loss of indigenous dominance. It is not a comprehensive assessment of pressures on points at a national scale, since the scale of assessment, in space and time, is not amenable for the collection of data on some key pressures that vary rapidly during and between seasons, as well as inter-annually (e.g. rodents, mustelids and non-native social wasps).

- The pressure index derives from the Point of Truth Calibration (PoTCal) approach which produces a single score for each sampling location. The approach engages multiple experts from a range of backgrounds, so that the final metric is inclusive and consultative.

- Experts each scored 16 sample points on the basis of information provided on (1) percentage of plant species that are non-native, (2) percentage of foliar cover from non-native plant species, (3) ungulate FPI, (4) lagomorph FPI, (5) possum Trap Catch Index, (6) percentage of bird species that are non-native and (7) percentage of individual birds counted that are non-native. Twenty-one experts collectively evaluated 126 sample points, and the scores from these formed the basis of a model for all sample points.

- Centres of vascular plant endemism throughout New Zealand were determined by modelled spatial analyses of diversity using indices based on taxonomic, phylogenetic and matrix (e.g. genetic dissimilarity) relationships, based on georeferenced herbarium specimens.

Where can I find more information (links)

Sinclair SJ, Griffioen P, Duncan DH, Millett-Riley JE, White MD 2015. Quantifying ecosystem quality by modeling multi-attribute expert opinion. *Ecological Applications 25*, 1463–1477.

Bellingham PJ, Cieraad E, Gormley AM, Richardson SJ 2015. Department of Conservation biodiversity indicators: 2015 assessment. Landcare Research Contract Report: LC2343 for Department of Conservation, Christchurch, New Zealand.

Laffan SW, Lubarsky E, Rosauer DF 2010. Biodiverse, a tool for the spatial analysis of biological and related diversity. *Ecography 33*, 643–647.

http://www.landcareresearch.co.nz/publications/innovation-stories/endemism-hotspots

https://www.mfe.govt.nz/sites/default/files/media/Biodiversity/CpDNA%20rbcl%20sequences.pdf